

1993 *Ground Water Protection in Virginia*

Sixth Annual Report of the Ground Water Protection Steering Committee

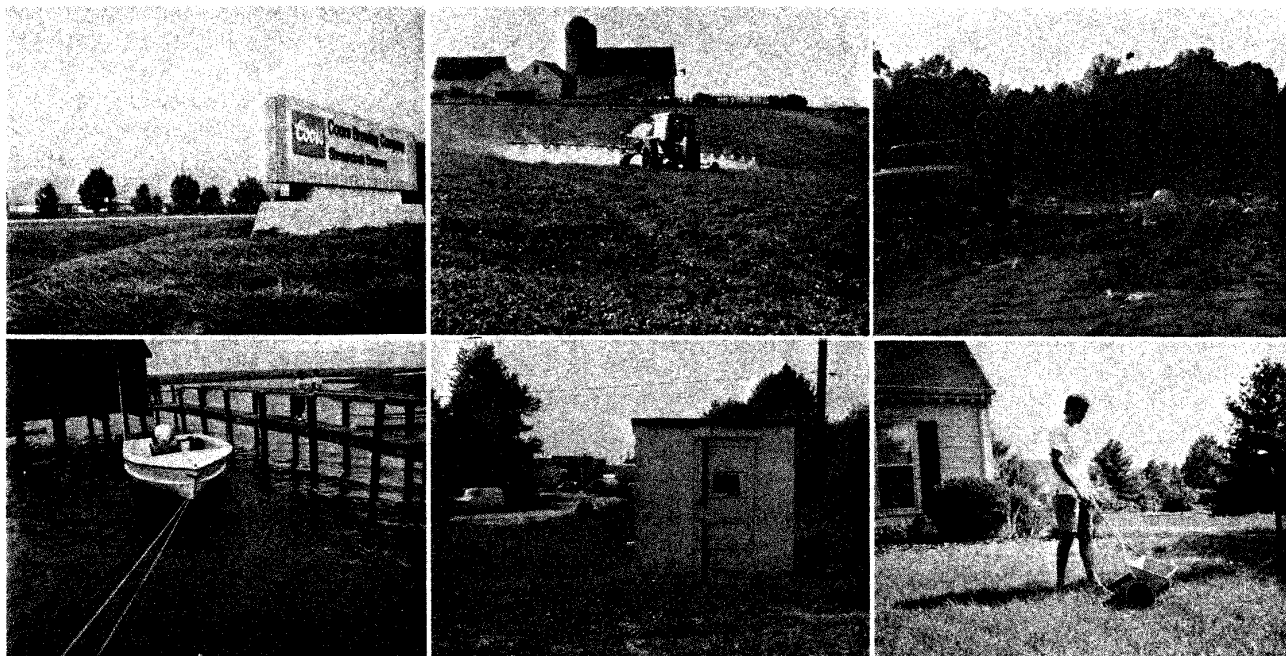


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About This Issue

This Report makes it clear that ground water is significant to many Virginians. Two long term observers point to growing public awareness. To industry, ground water can be essential to production. Farmers are significant users of ground water as well as pesticides which could impact ground water. Many local governments supply drinking water from the ground. They also play a central role in land use planning. Households are important end users of ground water but they, too, can impact the resource by their lawn care and waste water disposal practices. As you read through this issue, keep in mind the central concern that ground water represents for many Virginians.

- Ground Water Protection
Steering Committee

The Long Term Perspective: Two Officials Offer Views

Richard Burton was appointed to head the Department of Environmental Quality (DEQ) when it began operation in April of this year. Formerly, he was Executive Director of the State Water Control Board for ten years and a veteran of state and local government for over twenty years.

Dr. Robert Stroube was appointed Commissioner of Health in December 1991 following nearly twenty years with the Department of Health (VDH).

Both Burton and Stroube have been concerned with ground water in Virginia for more than a decade, and in their current positions play key roles in ground water protection. Both agreed to be interviewed for this issue of the Annual Ground Water Report. The following is a summary of some of their remarks.

Both officials were asked to characterize the changes that they have seen take place over the past decade or more.

Burton: Ten years ago people did not recognize how endangered ground water resources could be. He offered as one of the best examples of "the maturing of our understanding of the threat to ground water" the case of underground storage tanks, of which there are 70,000 in Virginia. Some 7,000 have been identified as leaking, and that number may grow to 10, 12, or 15,000 before all leaking tanks have been identified. The useful life of an unprotected fuel tank may be 20-30 years, so "in the past we buried something that was just waiting to cause problems." The tanks that go in today are protected in ways that will not cause the same problems in the future.

Stroube: Ground water was an "out of sight and out of mind" sort of thing ten years ago. Today, people are more aware of how our actions can and do impact ground water. This has come about both because of greater concern everywhere with the environment and because of the problems actually occurring here in Virginia. For instance, when we receive complaints of discoloration or odor in peoples' water, our investigations show that "what's going on the land directly impacts the ground water below." Water has become more of an issue in Virginia as we are coming to realize that it is not an unlimited resource.

This shift in attitudes about ground water and drinking water shows up in a number of ways. In 1990, the General Assembly changed the law governing septic tanks to charge VDH with considering ground and surface water in addition to public health. New regulations have since been proposed to better protect ground water. Other examples reflecting new attitudes toward ground water include the fact that since 1991, all private wells have had to meet minimum construction standards. Public drinking water supplies are now managed much more carefully because of the amendments to the federal Safe Drinking Water Act.

How are these changes reflected in today's practices?

Burton: "Today, industry recognizes that they have got to do things to keep from contaminating ground water. They realize that its going to cost them a lot of money to clean it up." The potential liability is huge. Ground water cleanliness is now a routine part of many business transactions involving the sale of property. It is a big issue between banks and purchasers. Over the past 5 years, ground water quality has become an important issue in all business transactions.

Stroube: One consequence for VDH has been the need to beef up the staff to implement several new programs. Through a combination of state and local funds and fees, 80-90 new environmental health specialists have been added to the Division of Environmental Health Services. The Office of Water Programs has been enabled to add to their staff, primarily based on fees, but with some federal support, in order to deal with the new federal SDWA amendment requirements.

How has policy and program change come about in Virginia?

Burton: The way public policy is often made is as a result of experiencing problems. That's why today we have an above ground storage tank program in Virginia. Unfortunately, it can take the occurrence of a localized incidence of a problem to provide the basis for putting management tools in place that prevent it from becoming a widespread problem. If I had to point to one frustration, it would be that it takes so long to put needed programs in place - to go from the point of identifying a problem, through legislation, developing regulations, devising a remedial action plan, and then to actual implementation.

What is the role of local government in ground water protection?

Burton: This is an area that still needs strengthening. Some localities do have strong ground water elements, but most do not. As areas evolve from rural to urban, threats to ground water generally increase. "Local governments have to act on the basis that land use decisions today have consequences 20, 30, or 40 years down the road. Land use planning is not a theory, there is reality to it - it is more than an exercise." The Ground Water

Protection Steering Committee has done the right thing to point out that there is a need and to identify various techniques, such as DRAS-TIC mapping and wellhead protection, that can be used by local governments to address these problems.

Stroube: I have been a member of the Planning Commission in New Kent County for the past three years. We have been struggling to deal with the Chesapeake Bay Act implementation, and we are very interested in ground water. Every time a rezoning or special permit comes up, ground water is discussed. The county now realizes that ground water is one of its major resources.

What new approaches do you see as you look to the future?

Burton: What's going to be needed in the future in Virginia is more coordination both between state and local governments and between state agencies. The new EPA requirements for comprehensive state ground water programs are going to require it. Fortunately, we have a head start in the Ground Water Protection Steering Committee. At this stage, we are waiting to see where some of the federal action is headed. DEQ will contribute by making sure our water quality and our waste management objectives are interlocked. The new department makes it clear that the Divisions of Water and Waste share a common mission. "For Virginia's sake, we have to make comprehensive environmental policy."

Stroube: One of the things that VDH is considering, and will be working on in the future, is outreach to get people in the private sector more involved. We realize that government can't be there all the time.

Another thing that is absolutely necessary for the future is an approach that looks at ground



water protection across the board - not just at development or at industrial plants or at farming. "We learned with the Chesapeake Bay that we can't look at things on the basis of individual programs. We have to coordinate in order to make things work."

Industry Relies on Ground Water in Virginia

When people think of ground water, the image that most often comes to mind is the individual well serving a suburban or rural home, or a public well supplying community needs. Ground water should also be thought of, however, as essential to industry and jobs in Virginia. This is apparent when the names of some of the states' heaviest ground water users are noted. These include Burlington Industries, Coors Brewing Company, E.I. DuPont De Nemours, Holly Farms, Perdue Farms, and Virginia Power.

The Coors plant in Rockingham County produces 4 million barrels of beer per year and uses an average of 940,000 gallons of ground water daily. The plant employs almost 400 people and is Rockingham County's largest taxpayer. Ground water drawn from one high capacity well supplies

most of the water used in production while two smaller capacity wells provide potable water to serve non-process related activities.

Principal Engineer at the plant, Warren Heidt, stressed the importance of having high quality water to blend in their beers. "When Coors was looking for a plant site in the Shenandoah Valley, they were interested in the quality and abundance of the water resources." Mr. Heidt explained that due to Coors emphasis on the use of all natural ingredients and the associated need to avoid any unnatural chemical adjustments, it was important to locate a water resource that would be "consistent in chemistry and flavor with the water from Golden Springs, Colorado," the home of Coors. The company recognized from the beginning the importance of protecting its ground water and purchased 2700 acres of land to provide protection to the two aquifers supplying its water. The actual plant site is 30 acres.

Ground water is also the sole source of water for processing and cooling at the DuPont plant located in Waynesboro. This plant, which produces textile fibers including Lycra® and StainMaster® Carpet, has 1500 employees on-site, contracts with 500 others, and contributes close to \$1,000,000 to Way-

nesboro's tax base. According to Lewis Garrett, an Environmental Associate at DuPont, uncontaminated water is critical in the processing of polymers. Most of the water utilized by the plant is drawn from one well at a depth of 650 feet which yields 2000 gallons per minute. A spring on the plant site can provide up to 5000 gallons of ground water per minute. Approximately 5 million gallons of ground water are used by DuPont per day.

James Eichelberger, Water and Waste Water Manager for Perdue Farms Incorporated in the Town of Accomac, says that "without access to the large supply of ground water on the Eastern Shore, the company would never have been able to establish this facility, invest in the community, or provide jobs and producer contracts in the Accomac area." Six production wells are accessed for a daily average of two million gallons of ground water at the plant. In addition, Perdue has an aggressive water conservation program including the recycling of one million gallons of its water each day.

This plant is one of ten processing facilities at Perdue Farms Incorporated which is the fourth largest poultry producer in the nation. The plant employs more than 1800 associates and contracts with about 400 chicken producers in the area.

EPA Issues Guidance for Comprehensive State Ground Water Programs

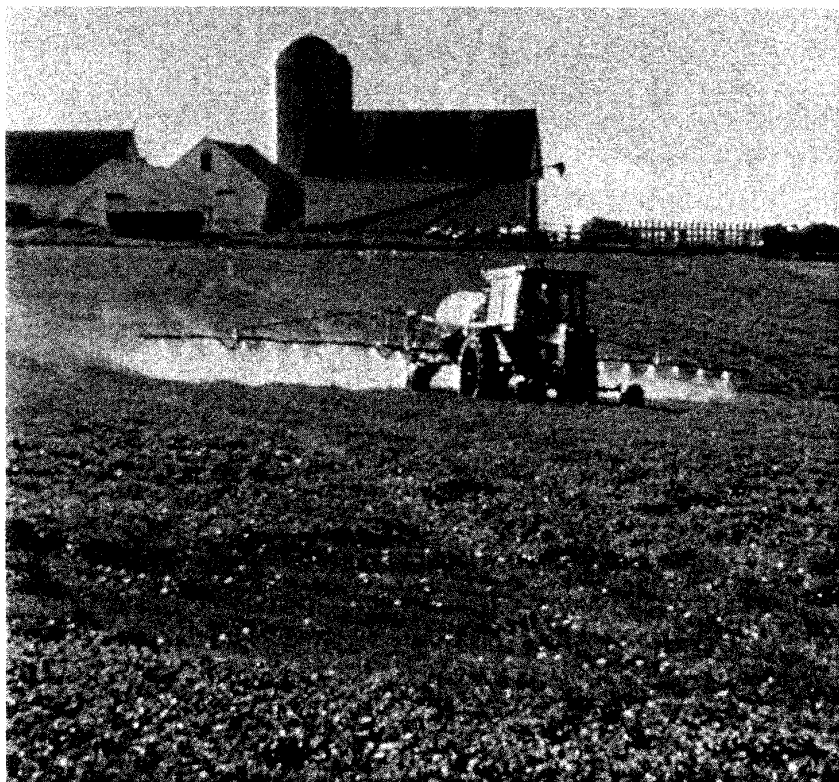
EPA has now issued the final guidance for its new Comprehensive State Ground Water Protection Program (CSGWPP). CSGWPP establishes a framework for what EPA describes as a new partnership of federal, state, local, and tribal governments to protect ground water resources. A CSGWPP consists of six Strategic Activities and Adequacy Criteria that a state must achieve for an EPA approved program. States who develop an

approved program may see increased flexibility in ground water related federal grants.

Currently a state's participation in the development of a CSGWPP is voluntary. However, EPA is pursuing inclusion of this program in the re-authorization of the Safe Drinking Water Act. While the Virginia Ground Water Protection Steering Committee (GWSPC) has supported the idea of a comprehensive ground water protection plan for Virginia, the Committee remains concerned that lack of personnel at both the state and federal levels and lack of or loss of funding will prevent implementation. In the future, the GWSPC will meet with EPA program officials to

Agricultural and Other Pesticides Addressed in New State Management Plan

A twenty-two member Pesticide and Ground Water Task Force was formed in early 1992 to develop a proposed Generic State Management Plan (SMP) for pesticides and ground water management in Virginia. The Task Force was created as a means of providing representation to all sectors interested in the issues of ground water protection and/or pesticide use and includes Virginia farmers, a pesticide retailer, homeowners using domestic wells, a municipal



gain insight on the adequacy criteria and program flexibility. Virginia's participation in this voluntary program has not yet been determined.

For copies of the Final CSGWPP Guidance, contact Virginia G. Thompson, EPA Region III Ground Water Protection Branch, at 215-597-6535.

water utility, environmentalists, local government officials, and representatives from a dozen state agencies.

When finalized, the Generic SMP will set out Virginia's overall strategy and general approach to pesticide use. The second part of the process will be a series of supplemental documents, each one

targeted to a particular pesticide that EPA decides to list as requiring an individual State Management Plan. States not having an approved Pesticide SMP will not be able to continue using a listed pesticide after the deadline established by EPA. Completing the Generic SMP in 1993 gives Virginia the advantage of being better prepared and organized to deal with specific pesticide requirements, which could come in the near future.

Most often, following pesticide product labelling instructions regarding use, handling, and application will be sufficient to protect ground water. It is thus expected that most pesticides will not be listed by EPA as requiring the new SMP process.

The proposed Generic SMP contains what is called a "graduated response" philosophy. When a pesticide is found in ground water, no more and no less a response will be made than is called for by the severity of the problem. When no problem is found, the goal is to maintain the absence of detections, and current practices will be continued. If a small amount of pesticide is detected in ground water, the goal is to prevent any further contamination, and so a review would be made of current Best Management Practices (BMPs) and educational programs, for instance, in order to see where practices need improving. If contamination levels increased, efforts would be stepped up and consideration would be given to requiring BMPs and/or requiring additional user certification training. If such preventive actions are successful, there would be no need to go further. However, if contamination persisted and the continued beneficial use of ground water, or surface water connected to the ground water, was threatened, then strict controls would be considered or the benefit of the pesticide would be reevaluated in light of that experience.

The Virginia Department of Agriculture and Consumer Services (VDACS) is the lead agency and

will be the source of all information and updates about the status of any SMP procedures.

Atrazine is Object of Monitoring Program

The Virginia Department of Agriculture and Consumer Services (VDACS) and the CIBA Corporation are cooperating on a limited ground water monitoring survey for atrazine, a herbicide used on corn. As the registrant of atrazine, CIBA is conducting a survey of atrazine and four of its degradation products in 20 states to fulfill EPA requirements for re-registration of the herbicide. The topic of degradation products in ground water is currently a data gap.

Between 50 and 100 drinking water well samples will be collected by VDACS in 14 localities around Virginia. The shallow drinking water wells, to be selected in conjunction with Virginia Cooperative Extension, will be in areas of high atrazine use and vulnerable ground water environments. Sampling will occur during the 1993 growing season with analysis by CIBA laboratories in Greensboro, North Carolina.

This is VDACS' initial effort in implementing a ground water monitoring study, and it is expected to provide valuable experience which will assist VDACS in implementing ground water monitoring programs required under future Pesticide State Management Plans (SMPs). In addition, the results of the laboratory analysis will provide data to VDACS on the presence of atrazine and its degradation products. Atrazine is thought to be one of the initial pesticides for which EPA will require a Pesticide SMP. Though limited in scope and samples collected, this program will add to the database of ground water analysis available for developing the monitoring program under an atrazine SMP.

Public Water Suppliers Face Safe Drinking Water Act Amendments

Various requirements of the National Primary Drinking Water Regulations and the 1986 amendments to the federal Safe Drinking Water Act (SDWA) will impact ground water suppliers and users in Virginia. The Virginia Department of Health (VDH) is the lead agency in meeting these requirements. Following is a summary of recent and pending implementation actions taken by VDH.

- *Total Coliform Rule (TCR).* VDH has now fully implemented the TCR monitoring program and is using a Coliform Presence/Absence test to identify water supplies which are contaminated with Coliform. The state performs and pays for the tests.

The rule has no impact on waterworks which do not show Coliform in routine samples. When a routine sample is Coliform "Present," however, increased monitoring frequency of the water source is required until repeat samples show no contamination. Otherwise, disinfection of the water is required.

- *Surface Water Treatment Rule (SWTR).* Implementation of SWTR is now actively underway. Waterworks owners with spring sources or with wells that experience quality fluctuations as a result of climatic changes may be classified as being under the direct influence of surface water. To continue use of such sources, the owner must provide filtration treatment.

- *Lead and Copper Rule (LCR).* Proposed final regulations incorporating this federal rule into the Virginia Waterworks Regulations are pending endorsement by the

Attorney General. Initial monitoring requirements have already become effective for large and medium waterworks. All small waterworks (less than 10,000 population served) must begin monitoring during the six month period beginning July 1, 1993.

The good news is that the General Assembly included funding in the Division of Consolidated Laboratory Service's (DCLS) 1993 budget for mandated lead analysis. The bad is that at least 10 percent of small systems are expected to exceed the 15 ppb action level that mandates the need for additional

congressionally-passed amendments offer opportunities for reduced monitoring, and VDH is attempting to assure maximum appropriate use of these options. Without new resources from the General Assembly, waterworks owners will have to pay private laboratories for whatever monitoring is ultimately required.

- *Radon and Other Radionuclides.* If the final radon monitoring rule retains the Maximum Contaminant Level originally proposed, the rule could easily impact more than half the ground

development stage, this rule has the potential to exceed all others in monitoring costs. Such contaminants as Giardia, Cryptosporidium, and enteric viruses are among those being considered for routine monitoring.

With these new requirements and their costs, it is especially important that every effort be made to prevent contamination of the state ground water reserves.

Department of Environmental Quality Established

The Department of Environmental Quality (DEQ), described as "Virginia's innovative approach to environmental management for the twenty-first century," began operation April 1. The new agency consolidates Virginia's regulatory programs for air, water, and waste management, and expands activities such as planning, policy development, and public outreach. DEQ will now be the lead agency for the Ground Water Protection Steering Committee (GWPSC), and the Water Division will continue as chair of the Committee.

Richard N. Burton, former Executive Director of the State Water Control Board, was named by Governor Wilder to head the new agency. "We are beginning an exciting and challenging chapter in Virginia's history," Burton said. "DEQ will improve our ability to manage a broad range of complex issues affecting our air, land, and water resources."

The new Department will be responsible for a broad range of Virginia's environmental activities, including many related to ground water protection. The GWPSC was established in 1986 to strengthen and coordinate ground water protection activities in Virginia. The consolidation of agencies to form DEQ in 1993 will improve these protection and coordination efforts and help advance ground water management in the state.

"There is a need for wellhead protection in Virginia.

Many public water supplies in Virginia depend wholly or in significant part on ground water wells. Replacement supplies or treatment would in most cases prove very expensive or impractical."

Wellhead Protection: A Handbook for Local Governments in Virginia (p.1)

treatment and public education.

VDH held about 30 seminars and workshops around the state to explain the new LCR requirements to waterworks owners. About 70% of Virginia owners attended and the remainder were given the information by mail or phone. Regardless, some owners are expected to fail to collect the required samples beginning July 1. VDH will send two warning letters to owners who are not in compliance. After that time, letters of violation will be issued, triggering federal enforcement through the EPA and U.S. Justice Department.

- *Phase II and Phase V Rules.* These federal rules set out complicated requirements for monitoring of Volatile and Synthetic Organic Chemicals and Inorganic Chemicals in drinking water. This creates a difficulty because Virginia's DCLS may not have the resources to perform all the necessary analyses which could include procedures requiring as many as ten different samples.

A complicated combination of waivers, grandfather clauses, and

water sources in Virginia. Aeration is the most likely treatment process to be required. The final federal rule is due to be promulgated later this year with state implementation then required in 18 to 36 months. Mandated monitoring could begin earlier for large or high risk waterworks.

- *Ground Water Disinfection Rule.* The 1986 SDWA Amendments mandate chlorination disinfection of all ground water waterworks sources. Currently, more than half of Virginia waterworks do not disinfect their sources. Owners of ground water sources without disinfection treatment should plan on having to install equipment and contact tanks by the end of 1996. However, EPA will provide a means for small waterworks with exceptionally good quality sources to have the disinfection requirement waived. Exact details and deadlines will be established by the final regulations that have yet to be promulgated.

- *Disinfection Byproducts Rule.* Though still in the negotiation and

New Office of Environmental Response and Remediation

The Waste Division of the Department of Environmental Quality (DEQ) has established a new Office of Environmental Response and Remediation. The office combines the activities of the former Department of Waste Management (DWM) "emergency" response group and a reactivated site clean-up program that had previously operated within DWM.

The office will respond to releases of solid and hazardous waste and seek remediation at sites where solid and hazardous waste have been mismanaged and are not being addressed by other state or federal clean-up programs. The remediation activities of the group will be especially important for ground water since unregulated waste sites can represent a substantial threat to ground water quality. Work required of DEQ by House Bill 1250 will help identify sites needing remediation. This bill calls for DEQ to list "abandoned waste sites," prioritize them, and estimate the cost of clean-up.

Brett Burdick, Office Director of Environmental Response and Remediation, can be reached for further information at (804)-527-5325.

Ground Water Withdrawal Regulations Completed

The 1992 session of the Virginia General Assembly passed the Ground Water Management Act of 1992, significantly changing the act originally adopted in 1973. Ground water withdrawal rights are established by the new act based on need as opposed to its predecessor, which established withdrawal rights based on maximum daily withdrawal. It is believed that this change will significantly reduce the total with-

drawals authorized by ground water withdrawal permits in existing ground water management areas. The new act requires that the Virginia Water Control Board (VWCB) adopt ground water withdrawal regulations and issue ground water withdrawal permits within ground water management areas in accordance with these regulations.

The new regulation establishes the mechanism to establish ground water management areas and requires that all users of more than 300,000 gallons of ground water per month apply for and receive a ground water withdrawal permit. The regulation establishes requirements for information that an applicant must supply in a ground water withdrawal application and the criteria that the staff of the Department of Environmental Quality (DEQ) will use when evaluating such applications.

The Ground Water Management Act of 1992 requires that previously exempt agricultural users obtain a ground water withdrawal permit for withdrawals in excess of 300,000 gallons per month. DEQ convened an Agricultural Ground Water Withdrawal Advisory Committee to provide the staff with guidance on drafting the portion of the regulation that will govern agricultural ground water withdrawals. This committee began its effort in

May of 1993. It is expected that the ground water withdrawal regulations will be amended in the winter of 1993 to include requirements for the issuance of ground water withdrawal permits to agricultural users.

For additional information contact Terry Wagner, DEQ Water Division, at (804)-527-5203.

New Solid Waste Regulations Protect Ground Water

Landfills were identified in the 1987 *Groundwater Protection Strategy for Virginia* as a primary source of ground water contamination. The 1993 amendments to the DEQ Waste Division's Solid Waste Management Regulations will do much to prevent contamination from permitted waste disposal facilities.

The amended regulations further strengthen ground water protection with improved landfill liner requirements and new monitoring requirements at permitted solid waste facilities. For example, the list of constituents that must be monitored at sanitary landfills has been increased and some indicator parameters, such as total organic carbon, have been replaced by specific chemicals. Consequently,



the first phase of monitoring at landfills will enable staff to identify ground water contamination more quickly and ensure a more immediate response.

Mining Legislation Protects Water Supplies

There were a number of bills and resolutions enacted during the past legislative session relating to mining and ground water protection, including the following:

- **HB 1687:** Requires the replacement of drinking, domestic, or residential water supplies and the repair of subsidence damage due to problems resulting from underground coal mining conducted after October 24, 1992.

This provision is similar to a provision contained in the federal Energy Policy Act of 1992. Virginia has primacy in regulating surface coal mining and the surface effects of underground coal mining in the state. As a condition for primacy, Virginia's laws and regulations must be at least as strict as federal laws and regulations. Therefore, the state legislation was necessary in order to maintain Virginia's primacy.

The Department of Mines, Minerals and Energy (DMME) is required to promulgate regulations to implement the new requirements. However, these regulations cannot be developed until after federal regulations are put forth. In the interim, DMME has developed guidelines, effective July 1, 1993, regarding the new requirements.

- **HB 2387:** Extends the area where water replacement may be required if damaged by a gas or oil injection well. Previously, the General Assembly enacted legislation that required water replacement within a one-quarter mile radius of a gas or oil injection well. HB 2387 amended the law to make the limit conform more closely with the limits

established under EPA's Underground Injection Control program, up to a one-half mile radius. There currently are only two operators with gas and oil injection wells permitted in Virginia, and there are no ground water users within the newly specified distances.

- **HB 1835 and HJR 538:** The moratorium on drilling oil production wells in Tidewater Virginia is extended by HB 1835 for one year (until July 1, 1994). HJR 538 continues the Joint Subcommittee Studying Oil and Gas Drilling in Tidewater Virginia. These together address needed controls on oil operations in Tidewater necessary to protect ground water and other environmental features.

Contaminated Water Supplies Addressed

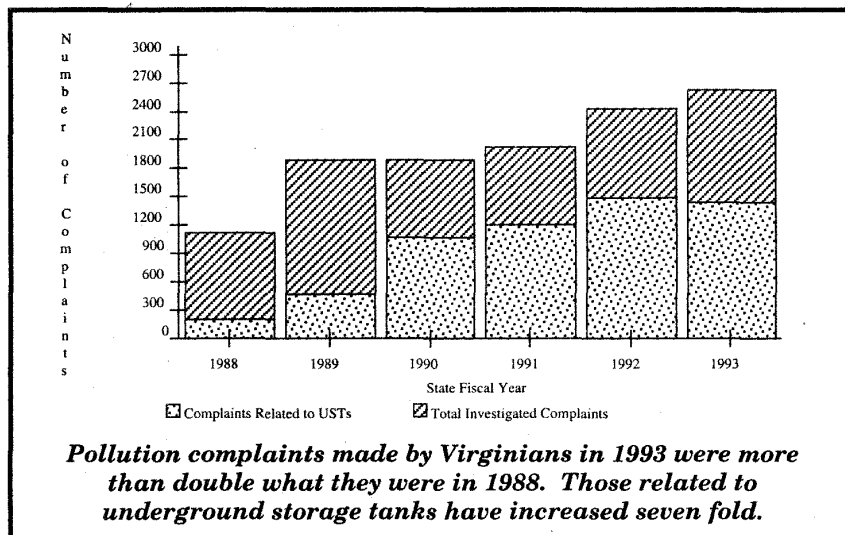
In 1988, the state Lead Cleanup Program was initiated to address sites contaminated by leaking underground petroleum storage tanks where the responsible party is unknown or incapable. In these cases, the state takes the lead in performing corrective actions to address the situation.

A major element of the program is the Alternate Water Supply (AWS) Project which provides potable water at sites where domestic

drinking water wells have been contaminated by petroleum hydrocarbons. Funding for these projects comes from the Virginia Petroleum Storage Tank Fund and the Federal Leaking Underground Storage Tank Trust Fund. To date, 175 cases have been addressed by the AWS project.

AWSs have been provided as both interim and long-term solutions. These include 87 interim point-of-use carbon filtration treatment systems in which contaminated ground water is treated after it is drawn from the ground, but before it reaches the tap. DEQ provides the operation and maintenance of these units. Long-term AWS projects include new wells at 18 sites, community well development at 2 locations, and 70 hook-ups to public water supplies.

One of the first sites addressed under the state Lead/AWS Project is also one of the largest projects being undertaken by the state. In White Post, located in Clarke County, petroleum releases from several contributing sources have contaminated 16 drinking water wells, with an additional 40 to 50 drinking water wells at risk of contamination. The state is working with the Clarke County Board of Supervisors and Clarke County Sanitation Authority to extend the Boyce-Milwood waterline two miles to provide safe and adequate drink-



ing water to the village of White Post. As a temporary water source, point-of-use treatment systems and a water tanker truck are providing potable water. The waterline extension is scheduled to be completed in March 1994.

In addition to the water supply extension, approximately 5000 tons of contaminated soils have been removed from three locations. Ground water remediation is being undertaken to reduce the risk of contaminant spread and further contamination of drinking water wells in the area. It is estimated that a "pump and treat" system using a diffused aerator, coupled with carbon filtration, will be in operation for 5 to 7 years.

For more information, contact David P. Chance, DEQ Water Division, (804)-527-5188.

Vulnerability of Ground Water to be Assessed

The Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation (DSWC), is initiating a study to characterize ground water vulnerability in different parts of the state. The purpose of this effort is to assist the Planning Committee of the Virginia Pesticides and Ground Water Task Force in prioritizing and developing ground water monitoring programs for Pesticide State Management Plans.

The first level of vulnerability assessment will consist of a broad statewide characterization using STATSCO from the USDA Soil Conservation Service at a 1:250,000 scale. STATSCO is a spatial display of soils in Virginia with an attribute table for each soil type. The attributes to be considered will be the type of soil and depth to the water table for the major geological subunits of Virginia. Pesticides usage data made available by VDACS will be overlain on the soils data to identify geographical areas of the state where ground water is more or less susceptible to pesticide contamination.



Upon completion of the broad statewide study, DSWC will undertake a second level characterization at a county/sub-county level. This effort will utilize soils data from VirGIS, a geographic information system, which include soil permeability, type of soil, depth to the water table, type of bedrock, and depth of bedrock. Soils data will be mapped for up to 10 counties at a 1:24,000 scale. This data will again be combined with VDACS pesticide usage data to provide a more detailed assessment of ground water vulnerability than that offered by the broad characterization.

Ground Water Impacts on Chesapeake Bay

During 1992, Virginia's Chesapeake Bay Program continued the funding of research by the Virginia Polytechnic and State University (VPI & SU) on the link between land uses and the quality of ground water discharged to the Chesapeake Bay. As reported in the 1991 Annual Report of the GWPSC, this research is headed by Dr. George Simmons, Jr., his colleagues and students. The research grant from EPA is administered by the Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.

Ground water monitoring in the lower Chesapeake Bay continued in 1992 at 10 study sites originally established in 1989. Five of the sites are agricultural, three are urban/residential, and two are wetland sites.

It was determined that buffer zones consisting of wetlands and forests are important in increasing the residence time of ground water. This allows microbial degradation of nitrogen, or biological denitrification, which is the process by which bacteria reduce nitrate to nitrogen gas under low oxygen conditions. Nitrate accounted for up to 99% of the dissolved inorganic nitrogen measured in submarine ground water discharge from the study sites. Higher denitrification rate potentials were found in the soils taken from the water table in a forest buffer as compared to soils from the water table in an adjacent agricultural field.

It was also demonstrated that it is important to know the hydrogeologic characteristics of buffer zones. Channelization of underlying soils and rapid movement of water does not allow microbial degradation of nutrients or pesticides. Direct connections of upland nutrient inputs to surface waters (e.g., tidal creeks) that bypass buffer zones include tilled fields draining excess water and ground water seeps from agricultural fields. In 1993, work will continue to evaluate the effectiveness of ripar-

ian areas along tidal creeks in nutrient removal.

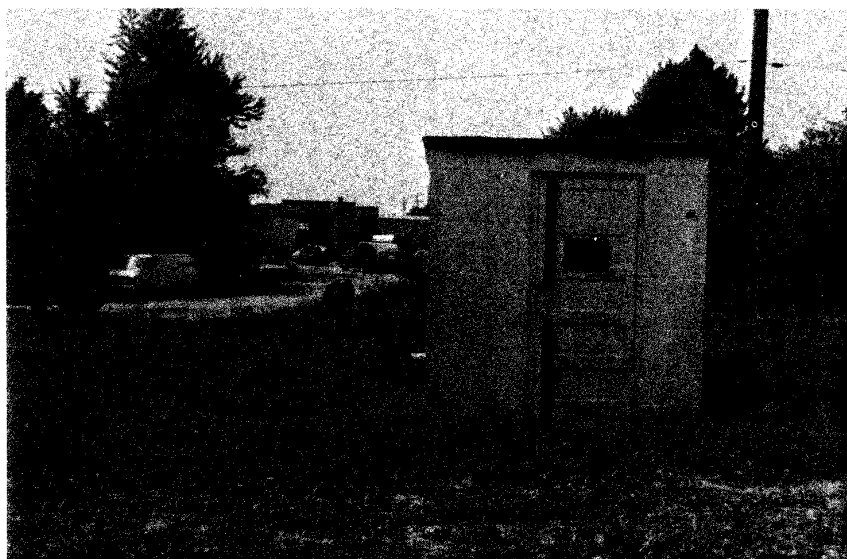
Research was also initiated to determine the influence of submarine ground water discharge on living resources of the Chesapeake Bay. Two study sites were selected with different shallow ground water discharge patterns in the Cherry-stone Inlet which is located on the Bay-side of the Eastern Shore. Growth rates of the hard clam *Mercenaria mercenaria* were compared among clams being grown in Cherrystone Inlet as part of an aquaculture operation. The clam beds are located in the nearshore environment, and ground water from the shallow unconfined Columbia Aquifer discharges into the area. Results of this study will be available in 1993.

Dr. George Simmons has published a number of articles and can be reached at VPI & SU at (703)-231-6407.

Local Government's Role in Wellhead Protection

"Wellhead protection" is not a household phrase in Virginia - yet! With the recent publication of Wellhead Protection: A Handbook for Local Governments in Virginia, however, it is expected this will change as local governments, municipal utility departments, businesses and citizens utilizing community wells, and others become familiar with this approach.

Wellhead protection is the term applied by EPA to describe a process for assessing potential threats to ground water, for managing land uses and activities in the area near public wells, and for planning to prevent problems before they arise. This new *Handbook* sets out a series of steps aimed specifically at local governments in Virginia to help localities get started with wellhead protection. The *Handbook* outlines a range of options that allow decision makers to tailor specific wellhead protection programs to their particular situation and to reflect local land use patterns, hydrogeology, staff skills



and the availability of alternative water supplies.

The Virginia Ground Water Protection Steering Committee, which has published this report, found that:

- There is a need for wellhead protection in Virginia because many public water supplies in Virginia depend wholly or in significant part on ground water wells. Replacement supplies or treatment would in most cases prove very expensive or impractical.
- Local governments in Virginia have the land use authority needed for wellhead protection. The state code was specifically modified in 1988 and in 1990 to give localities clear authority to use their planning and zoning powers to protect ground water and public water supplies.

Several Virginia localities have already recognized the need for wellhead protection and have implemented related studies and programs. Henrico and Roanoke Counties participated in a pilot wellhead protection study funded by the Department of Environmental Quality (DEQ) Water Division, and EPA directly funded four such efforts with Wellhead Protection Demonstration Grants in the Accomack-Northampton Planning District, the Town of Fincastle/Botetourt County, Nelson County/

Thomas Jefferson Planning District, and the Town of Stanley/Lord Fairfax Planning District.

The grants gave these localities the opportunity to study the need for wellhead protection in their jurisdictions and to test several methods of implementation. For example, Henrico County's pilot project involved collecting data for all of the public water supply wells in the county, delineating wellhead protection areas for each well, examining the existing zoning, and considering potential options for protecting the ground water in these areas. In Roanoke County, wellhead protection areas were defined for three county-owned wells which provide a significant contribution to the county's water system, and Wellhead Protection Overlay Districts were proposed.

A follow-up report to the *Handbook* is being developed by the Steering Committee to provide information on the processes and methods used by each of the localities in their pilot wellhead projects. These case studies will identify problems encountered, as well as outline the most successful approaches. The case study report is due for publication in the fall of 1993. For copies of either report and for questions about wellhead protection, contact Mary Ann Sykes at DEQ Water Division, P. O. Box 11143, Richmond, Virginia 23230, or call (804)-527-5201.

Households Addressed by Cooperative Extension

Virginia Cooperative Extension continued its ground water protection education program in 1992-93 for both urban and rural audiences. These programs are conducted in every county in Virginia and in many cities. Ground water related programs include nutrient management, proper pesticide use, youth education, teacher environmental education, and programs for elected/appointed officials. Two specific projects are described below.

- **Well Protection / Farm-A-Syst / Water Testing:** In 1989, Virginia Tech initiated a program of household water quality education in Warren County which included water sampling, testing, and diagnosis. With support from USDA, the program has since been expanded to two additional counties each year.



With funding from the Powell River Project, in addition to Extension and local governments, the program is now being expanded to seven Southwest counties in a joint effort between Extension and the Virginia Water Resources Research Center. The objective here and in the earlier programs is to educate and inform residents and local decision-makers about the status of their water quality and about activities to protect and maintain quality. An additional objective is

to improve the capacity of local agencies and organizations to support efforts by citizens to maintain and improve household water supplies.

- **Chesapeake Bay Residential Watershed Project:** This was the second year of this project in Prince William County funded by USDA. Demonstration lawn projects were established in two major subdivisions and an on-site septic system workshop was organized. The overall objective of this project is to develop a statewide model for public information programming on residential lawn care practices and alternative septic systems as they impact on the Chesapeake Bay watershed.

The first component of the project is a high visibility program that uses residential field days in locations throughout the county. Demonstrations are centered around topics such as soil testing, proper fertilizing, leaf recycling,

mowing and pruning, composting, use of native plants, and integrated pest management, in combination with individual demonstration lawns that have actually adopted the recommended practices.

The second component explores septic system alternatives from public policy and installation/maintenance perspectives. A one-day conference provided technical information and policy discussions on remediation of failing systems, integration of public and private

systems, and availability and use of alternative on-site wastewater treatment and disposal systems.

Counties Benefit from Pesticide Disposal Program

The Virginia Department of Agriculture and Consumer Services (VDACS), in cooperation with the Virginia Pesticide Control Board, Virginia Cooperative Extension, Virginia Division of Consolidated Laboratory Services, and local governments, implemented a second pesticide disposal effort during 1992. Five counties were selected to participate in the 1992 Program: Accomack, Nelson, Northampton, Nottoway, and Rockingham.

The program was conducted in June 1992, with 191 farmers and pesticide dealers participating in the 5 counties. A total of 57,237 pounds of unwanted, outdated, or banned pesticide waste was collected for disposal. The prevalent pesticide wastes collected included DDT, carbofuran, orthoxenol, disulfoton, and arsenic-containing pesticides.

VDACS will be implementing a third pesticide disposal program in 1993. The localities selected for the 1993 program are: Rappahannock, Southampton, and Warren Counties, and the City of Suffolk. It is projected that 57,000 pounds of pesticide waste will be collected at a cost of approximately \$285,000.

DEQ Water Division will cooperate in funding the 1993 program. DEQ has committed \$100,000 of their FY93 EPA Section 106 Clean Water Act Ground Water Protection grant to support the program. This is being matched by VDACS with \$100,000 from their FY93 EPA FIFRA Grant. This would be the first time that different grant funds from separate agencies will be combined to implement a Pesticide Disposal Program and indicates the critical cooperation and support between the agencies for protecting ground water from contamination.

Pollution Prevention Promoted

The Waste Reduction Assistance Program (WRAP) in DEQ's Waste Division, which has been distributing material on pollution prevention and waste minimization since 1989, intensified its outreach efforts this past year. In addition to supplementing its growing library of fact sheets, videos, and reports, the program broadcast two teleconferences on waste reduction and held a series of workshops for ship builders and ship repair facilities.

The 1993 General Assembly enacted legislation establishing a formal pollution prevention program for the Commonwealth of Virginia which will further strengthen WRAP. The purpose of the program is to provide technical assistance and information to state agencies, local governments, industries, businesses, and citizens on ways to reduce the volume and toxicity of waste generated. By doing so, the program will help

protect ground water in the state.

For more information about WRAP and pollution prevention, call Harry Gregori at (804)-225-2997.

Local Planning Officials Take Training Programs

By improving the quality of local planning through education, Virginia's local governing officials, planning commissioners, and staffs will be better able to address long-term ground water protection strategies. Since these strategies often involve development restrictions, it can be difficult to persuade community leaders to implement unpopular measures before actual ground water problems occur. Therefore, educating planning officials about the difficulty of remediation and the effectiveness of preventative planning measures is essential. This is being done by the Department of Housing and Community Development (DHCD) in conjunction with Virginia

Cooperative Extension.

Since 1976, DHCD and Extension have offered the Institute for Planning Commissioners. This program features a wide range of topics on land planning (including ground water protection) and plan implementation. To date, over twelve hundred planning commissioners, zoning and subdivision administrators, and other local government officials have attended.

In 1985, training was expanded to include the Certified Planning Commissioners' Program. It was expanded again in 1988 to include the Certified Board of Zoning Appeals Program.

Since the inception of these programs, certificates have been issued to over a thousand participants representing eighty percent of Virginia's cities and counties. This presents a valuable opportunity to highlight the importance of ground water protection to local decision-makers and may be an important reason that ground water awareness in the state has grown over the past decade.

***Water quality preservation is everyone's concern.
If you suspect a pollution incident has occurred, please call:***

**Virginia Department of Environmental Quality
Pollution Response Program
(for pollution incidents involving surface and ground water)**

1-804-527-5200 24-hour Hotline

**Department of Emergency Services
(for spills involving hazardous materials)**

1-804-674-2400 24-hour Hotline



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